Control in a behavioral context

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Notation

Symbol	Short description	Page
$\mathbb{Z}_+$	set of non-negative integers	
$\mathbb{R}$	set of real numbers	10
$\mathbb{R}_+$	set of nonnegative real numbers	
$\mathbb{R}_-$	set of nonpositive real numbers	
$\mathbb{C}$	set of complex numbers	11
$\mathbb{C}^-$	set of complex numbers with negative real part	11
$\overline{\mathbb{C}^+}$	set of complex numbers with nonnegative real part	11
σ, σ^t	shift-operator	16
$\mathbb{W}^{\mathbb{T}}$	set of maps $\mathbb{T} \to \mathbb{W}$	14
$\mathfrak{C}^\infty(\mathbb{R}, \mathbb{R}^{\mathtt{w}})$	set of infinitely differentiable functions $\mathbb{R} \to \mathbb{R}^{\mathtt{w}}$	10
$\mathfrak{D}(\mathbb{R}, \mathbb{R}^{\mathtt{w}})$	set of infinitely differentiable functions with compact support	18
$\mathfrak{L}_1^{\mathrm{loc}}(\mathbb{R}, \mathbb{R}^{\mathtt{w}})$	set of locally integrable functions	18
$\mathfrak{L}_2(\mathbb{R}, \mathbb{R}^{\mathtt{w}})$	set of functions square integrable on $\mathbb{R}$	136
$\deg M$	degree of one variable or two variable polynomial matrix M	10,12
det	determinant	
$P^{(k)}(\xi)$	k^{th} formal derivative of the polynomial matrix $P(\xi)$	30
$\binom{j}{\ell}$	Binomial coefficient	11
Im	image of linear map	28
ker	kernel of linear map	
$A \subseteq B$	the set A is contained in, and possibly equal to, the set B	
$A \subsetneqq B$	the set A is properly contained in the set B	
$I_{\mathtt{n}}$	the identity matrix of size $\mathtt{n}$ by $\mathtt{n}$	10
$0_{\mathtt{n}_1 \times \mathtt{n}_2}$	the zero matrix with $\mathtt{n}_1$ rows and $\mathtt{n}_2$ columns	10
coldim(M)	the column dimension of the matrix M	10
rowdim(M)	the row dimension of the matrix M	10
dim(M)	size of a square matrix M or number of components in vector M	10

Symbol	Short description	Page
$\operatorname{rank}(M)$	the rank of M (more at index: rank)	11
$\operatorname{sign}(M)$	the signature of M (more at index: signature)	99
$\operatorname{Re}(\lambda)$	the real part of $\lambda \in \mathbb{C}$	
$\bar{\lambda}$	the complex conjugate of $\lambda \in \mathbb{C}$	137
A^T	the transpose of the matrix A	
$\operatorname{col}(A_1, A_2)$	$\begin{bmatrix} A_1^T & A_2^T \end{bmatrix}^T$	10
$\operatorname{diag}(r_1, r_2)$	the diagonal matrix constructed from r_1 and r_2	10
$\mathtt{w}$	number of components in the vector valued w, i.e. $\mathtt{w} = \dim(w)$	10
$\mathfrak{L}^{\mathtt{w}}$	the set of linear differential systems	17
$\mathfrak{L}^{\mathtt{w}}_{\mathrm{cont}}$	the set of controllable linear differential systems	28
$\mathfrak{B}$	a behavior	14
$\mathtt{w}(\mathfrak{B})$	the number of components, i.e. $\dim(w)$, of an element w in $\mathfrak{B}$	34
$\mathtt{m}(\mathfrak{B})$	the input cardinality of $\mathfrak{B}$	32
$\mathtt{p}(\mathfrak{B})$	the output cardinality of $\mathfrak{B}$	32
$\mathtt{n}(\mathfrak{B})$	the McMillan degree of $\mathfrak{B}$	92
$\Pi_w(\mathfrak{B})$	the projection of $\mathfrak{B}$ to a subset w of its variables	20
$\mathcal{N}_w(\mathfrak{B})$	the behavior that is hidden from the variables other than w	46
$\mathfrak{B}_{\mathrm{cont}}$	the controllable part of behavior $\mathfrak{B}$	35
$\mathfrak{B}^{\perp}$	the orthogonal complement of a controllable behavior $\mathfrak{B}$	
$\chi_{\mathfrak{B}}$	characteristic polynomial of an autonomous behavior $\mathfrak{B}$	30
$\mathbb{R}[\xi]$	set of polynomials with real coefficients in one indeterminate ξ	10
$\mathbb{R}^{\mathtt{n}_1 \times \mathtt{n}_2}[\xi]$	set of real polynomial matrices with $\mathtt{n}_1$ rows and $\mathtt{n}_2$ columns	10
$\mathbb{R}^{\bullet \times \mathtt{n}}[\xi]$	set of real polynomial matrices with $\mathtt{n}$ columns	10
$\mathbb{R}^{\mathtt{p} \times \mathtt{m}}(s)$	set of real rational matrices of size $\mathtt{p} \times \mathtt{m}$	
$\mathbb{R}[\zeta, \eta]$	set of polynomials in two indeterminates ζ and η	12
∂	operates on $\Phi \in \mathbb{R}^{\mathtt{w} \times \mathtt{w}}[\zeta, \eta]$ by $\partial\Phi(\xi) := \Phi(-\xi, \xi)$	107
$\bullet$	operates on $\Phi \in \mathbb{R}^{\mathtt{w} \times \mathtt{w}}[\zeta, \eta]$ by $\overset{\bullet}{\Phi}(\zeta, \eta) := (\zeta + \eta)\Phi(\zeta, \eta)$	107
$\operatorname{mat}(R)$	the coefficient matrix of one or two variable polynomial matrix R	90,99
$\|\|G\|\|_{\mathcal{H}_\infty}$	the $\mathcal{H}_\infty$ norm of $G \in \mathbb{R}^{\mathtt{p} \times \mathtt{m}}(s)$	
Σ	dynamical system (page 14), signature matrix (page 98), supply rate (page 117)	